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U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE
CALIFORNIA FOREST AND RANGE EXPERIMENT STATION
Division of Forest Insect Research

MOUNTAIN PINE BEETLE CONDITIONS
DINGLEY AND DELANEY CREEKS
YOSEMITE NATIONAL PARK
FALL, 1958

Introduction

In September 1958, an appraisal survey was made and spotting operations conducted on a bark beetle infestation in the Dingley Creek and Delaney Creek drainages, just north of Tuolumne Meadows in Yosemite National Park. The mountain pine beetle, Dendroctonus monticolae Hopk., in this area is killing old-growth lodgepole pine which has been severely defoliated by the lodgepole needle miner, Recurvaria milleri Busck. The purpose of the survey was to check the effectiveness of recent mountain pine beetle control work, and to provide a basis for estimating control needs for the coming year. R.C. Hall, B.E. Wickman and R.L. Rennie of the California Forest and Range Experiment Station took part in the survey.

The mountain pine beetle outbreak in the vicinity of Tuolumne Meadows has been in progress since 1952, having started in nearby Conness Basin. In recent years the principal infestation has been in the Dingley-Delaney Creek area. Control work has been conducted in the Dingley Creek drainage for the last three years in an attempt to prevent the epidemic from spreading to the high-use area of Tuolumne Meadows. The most recent control project was conducted in the spring of 1958.

While control has undoubtedly slowed the progress of the outbreak, it has not succeeded in containing the beetle's advance. This was apparent from preliminary findings of the survey, for it was soon evident that the outbreak was continuing. Consequently the Park began spotting infested trees in mid-September preparatory to treatment. Most of the infested area was spotted by two 5-man crews, during the period of September 16 to October 13, 1958. The crews were made up of Park Service treating personnel and were trained prior to spotting by B.E. Wickman. The infestation picture presented in this report is based on the combined results of the appraisal and spotting operations.

Infestation Area

The infestation area, nearly 2,700 acres in size, is the same as the one mapped by Trostle in 1957.^{1/} Preparatory to control in June 1958, the area

^{1/} Mountain Pine Beetle Conditions, Dingley and Delaney Creeks, Yosemite National Park. June 12, 1958, by Galen C. Trostle.

was subdivided into smaller natural units called control blocks. These blocks, and their approximate acreages progressing from north to south, are as follows: Block A, 180 acres northwest of the Young Lake trail (see map). Block B between the trail and Dingley Creek, 600 acres. Block C contains about 600 acres from Dingley Creek southeast to the ridge above Delaney Creek. At this point a base line running N45°E, from the Young Lake trail to the Dog Lake-Young trail, is established with a string line. Block D extends from this base line to Delaney Creek and contains 540 acres. The last area, control Block E, contains about 760 acres, extends from Delaney Creek to the Dog Lake trail and the ridge east of the Soda Springs Road.

Blocks B, C, and D were strung interiorly at three-chain intervals, running N45°E. Blocks A and E had no boundary or interior string lines. Natural features and trails were used for boundaries on these two blocks.

In the 1958 spring control project, all infested trees on most of the infestation area were to have been treated. The estimated total, according to the 1957 survey, was 1,252 trees. Spotting was done in June, and as spotting operations progressed nearly half the trees were found to have very poor broods. Many trees had a "sour sap" condition. Due to this fact, and because the time available for control work was limited, only 450 trees were treated. The heaviest beetle populations were in the Dingley Creek drainage; consequently control was limited to 600 acres northeast of Dingley Creek.

Appraisal

The appraisal this fall was conducted on September 9 and 10. The survey was run by sampling 1/4-acre circular plots placed every 5 chains along odd-numbered string-lines in Block B. Block A was sampled with one line of plots parallel to the trail. Blocks C and D were sampled by means of 1/2-chain-wide continuous strips run on odd-numbered string lines. Block E was sampled by several random lines of plots and strips.

A total of 2,680 acres was covered during the survey. On 117 acres sampled, there were 0.91 ± 0.14 trees per acre. The sampling error was 15 percent. The sample taken on several blocks was not large enough to be statistically sound, but the total figure represents a 4 percent cruise of the 2,680 acres.

Spotting

The survey showed at once that control has not contained entirely the beetle's advance on Tuolumne Meadows. Therefore, spotting operations were undertaken this fall to find, map, and mark all infested trees in the Dingley and Delaney Creek drainages, preparatory to control next spring.

The spotting crews utilized the blocks and interior stringing for their work. Five men abreast proceeded down a lane 3-chains wide between two string lines. All watched for insect-infested trees. When a tree was

found, one man painted a breast-high stripe around the tree, gave it a number, measured and recorded its d.b.h. in a notebook. The crew leader, who was responsible for mapping, placed the tree number in the proper location on his 1" = 5-chains scale map and was responsible for keeping the crew moving abreast and assigning tree numbers. Blocks B and D were spotted in this manner. Blocks A and E were not strung so the crew leader mapped with the aid of a compass or topographic features. Block C and part of Block D were not spotted.

Table 1 shows the actual number of trees spotted on the blocks. Block C and eighty acres of Block D were not spotted and the number of trees on these two blocks is an estimate based on the September survey.

Table 1--Number of mountain pine beetle-infested trees spotted in control blocks during September-October 1958

Control blocks	Acres	Infested trees
A	180	185
B	600	1,129
C	600	(258) <u>1/</u>
D	540	286 + (108) <u>1/</u>
E	<u>760</u>	<u>120</u>
Total	2,680	2,086 includes <u>1/</u>

1/ Not spotted, number estimated.

Breast-high diameters of the infested trees range from 8 to 56 inches, with an average diameter of 26 inches. About 40 percent of these trees are in the 24- 30-inch diameter class.

Status of Infestation

The total infested area has remained about the same as in 1957, but beetle populations have increased in the stand adjacent to Tuolumne Meadows, specifically, Blocks D and E. Populations have also increased considerably in the eastern corner of Block B (see map). The appraisal indicated that the mean number of infested trees on the entire area was 2,439. Data from the spotting operations combined with survey data indicate that the total is 2,086. The actual number of infested trees probably lies somewhere between 2,000 and 2,800. Late fall attacks and the normal number of trees missed during spotting could make the higher total possible.

Many trees are attacked on one side or on a narrow strip. Some have light attacks per unit of bark surface. Ips sp. beetles are attacking the bases and thin-barked sides of many of the infested trees. It was practically impossible this fall to tell if any of the attacked trees would develop sour sap by next spring.

The most important factor in the mountain pine beetle population increase is the large number of heavily defoliated trees that are slowly dying throughout the needle miner-infested area. Some trees appear to be killed from defoliation alone. As long as such trees exist, pockets of epidemic beetle infestation probably will continue to develop. Mountain pine beetle control must be considered, at best, a holding action or maintenance protection of some valuable local stand. The ultimate control of the beetle depends on the control of the needle miner.

If direct control action is not undertaken against the mountain pine beetle in the Dingley Creek and Delaney Creek drainages, there is every indication that beetle populations will continue to grow at a fast rate and will expand into uninfested stands around Tuolumne Meadows that have not yet been seriously damaged. Partial treatment of the infested area, that is only certain blocks, would probably not contain the epidemic for any great length of time because of the probability of reinfestation from nearby untreated areas. If only part of the area is to be treated, Blocks D and E should receive highest treatment priority because of their proximity to Tuolumne Meadows.

Control Possibilities

Considering the size of infested trees, control with chemical sprays would probably take precedent over the burning method. Large trees can be felled and bucked into more easily handled sections and the spray applied with a garden sprinkling can. Small trees and low-strip kills could possibly be treated by means of stirrup pump and extension rod with a high-volume nozzle. The pump is used in a 5-gallon Jeep can filled with insecticide. Ethylene dibromide is the insecticide recommended for use on lodgepole pine and the procedures, with one exception, are outlined in Forest Research Note No. 122. ^{2/} The exception involves a recent change in emulsifiers. Instead of the emulsifiers previously recommended, Triton X-151 and Triton X-171 should be used. In addition, mixing should be done in the exact order and proportions given below:

- 3 gallons of diesel oil
- 3 quarts of emulsifier made from 1 pint Triton X-151
and 5 pints Triton X-171
- 5 quarts ethylene dibromide (85 percent)
- 20 gallons water

This formulation makes 25 gallons of mixed spray.

The use of contract treating crews on some blocks or the entire infestation might be considered as a method of reducing treating costs.

^{2/} "Ethylene dibromide emulsion spray for control of the mountain pine beetle in lodgepole pine," by R.E. Stevens, California Forest and Range Experiment Station.

Treatment of infested trees should be concluded by July 1. By that time most overwintering broods have matured to adults and emergence has begun.

Berkeley, California
November 24, 1958

Boyd E. Wickman,
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Attachment

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Tuolumne Meadows
Yosemite National Park
Mountain Pine Beetle
Infestation

Sept.-October, 1958

1/2 1
Scale 2" = 1 mile

————— Control Boundry